opinion of scientific men seems to be divided as to the reception of this theory; but whatever may be thought of its truth, it has at least the merit of referring the light and heat to known causes.

The mathematical theory of magnetism was developed by the illustrious Poisson, but was made to rest on foundations in some respects too speculative. This subject has been taken up by Professor Thomson, who in a lucid and satisfactory manner has placed the theory on the basis of observed facts, so as to render it independent of any ulterior suppositions which may be adopted respecting the nature of magnetism. Two papers on this subject are published in the 'Philosophical Transactions,' and others, containing the theory of magnetic induction, are promised. More recently Professor Thomson has published a series of papers devoted to the mathematical theory of the submarine telegraph, and has been engaged in a series of experimental researches relating to voltaic electricity, which formed the subject of the Bakerian Lecture delivered in the session just concluding, and of which the detailed account will shortly be in the hands of the Fellows of the Society.

PROFESSOR THOMSON,

Accept this Medal in testimony of our admiration of your able mathematical and physical researches.

Obituary Notices of deceased Fellows.

JAQUES CHARLES FRANÇOIS STURM was born at Geneva in September 1803, of a family which had quitted Strasbourg in the middle of the last century, where one of his ancestors had been President of the Republic at the period of its contests with the Emperor Charles V., and another had attained a distinguished reputation for his writings on jurisprudence and theology. After completing his school education and his classical studies at the College with remarkable success, he became in his fifteenth year a student of the University of his native city, where his rapid progress in the study of mathematics and philosophy attracted the marked attention of the well-known geometer Simon Lhuillier, who fully anticipated the eminence which he was afterwards destined to attain.

The sudden death of his father, leaving his mother and four children, of whom Charles was the eldest, without any adequate maintenance, compelled him, before the close of his seventeenth year, to resort to private tuition for the support of himself and his family; and three years afterwards he was recommended to the Duc de Broglie, as tutor to the brother of Madame de Broglie, the son of Madame de Stael. At the close of the year 1823, he accompanied his pupil to Paris, and though he shortly afterwards returned to Geneva, he found no sufficient occupation there, and he finally resolved, in company with his intimate friend and school-fellow, M. Colladon, the present distinguished Professor of Physics at Geneva, to seek his fortune in the great city, which was then, and had long been, the undisputed metropolis of European science. Sturm had already become very favourably known to mathematicians by several articles in the 'Annales de Mathématiques' of M. Gergonne, on different branches of analysis and geometry, and the strong recommendations which he and his companion bore with them from Lhuillier, and the kind offices of M. Gerono, made them known to Ampère, Fourier, Arago, and other eminent members of the Institute, who recommended them to pupils as a means of support. Sturm afterwards obtained employment upon the 'Bulletin Universel,' under Baron Férussac, and was, in fact, a subordinate in the office of that journal when he published his well-known Theorem. He and his friend speedily began to feel the influence of breathing in an atmosphere of science, and their joint labours were rewarded by a distinction of no ordinary importance, when the Academy of Sciences awarded to them the great prize of mathematics proposed for the best Essay on the Compression of Liquids.

The determination of the number of real roots of a numerical equation which are included between given limits, is a problem which had occupied the attention of the greatest analysts of the past age, of Waring, of La Grange, and more especially of Fourier, who of all other analysts had made the nearest approaches to its practical, though he had failed in its theoretical, solution: the attention of Sturm had been for some time directed to this class of researches, which he pursued with remarkable continuity and diligence, encouraged, as he himself assures us, by the instructions and advice of this eminent master. The result was the discovery of the theorem which

will be for ever associated with his name, and which conquered the difficulty which had embarrassed all his predecessors, and thus permanently extended the dominion of analysis; a rare good fortune, which though frequently denied to the most illustrious cultivators of the sciences, is always reserved to those only who are enabled, by the extent and accuracy of their knowledge and the clearness of their views, to follow out the glimmerings of light which escape the observation of ordinary eyes.

The memoir which contained this important theorem was presented to the Academy on the 25th of May, 1829, and rapidly conducted its author to fortune and public honours. The connexion of its author with the 'Bulletin Universel' enabled him to give an immediate account of his method to the world; the paper itself was not published till some years afterwards, in the "Mémoires des Savans Etrangers."

In the course of a few years he was chosen a member of the principal scientific societies of Europe: the Copley Medal was given to him by this Society: he was elected a member of the Academy, as the successor of Ampère, in 1836: in the same year he was made Professor of Mathematics, upon the special recommendation of Arago, at the Collège Rollin, Répétiteur at the Ecole Polytechnique in 1838, and in 1840 he was deemed worthy to succeed to the chair of Mechanics at the same school, which had been so long honoured by the occupation of Poisson, the most illustrious of the successors of La Place. It was not without some difficulty that the substantial rewards of his scientific achievement were obtained: he was a foreigner, and naturally placed at a disadvantage in a contest with native competitors. It is right to notice this, both for the honour of France and as a proof of the very high reputation which Sturm had attained.

The subsequent memoirs of Sturm, whether first presented to the Academy or not, were chiefly printed in the Journal of M. Liouville, an analyst of congenial tastes and pursuits with his own, with whom he lived on terms of the most affectionate friendship. Two of these memoirs, relating to the discussion of differential and partial differential equations, such as present themselves so commonly in the solution of the more important problems of mathematical physics, possessed a merit so extraordinary, that M. Liouville—a most compe-

tent judge, declared—at a time when he was himself a competitor with Sturm for a place in the Academy,—"that impartial posterity would place them by the side of the finest memoirs of La Grange." The first of these two memoirs was presented in 1833 to the concours for the great prize of Mathematics, to be awarded by the Academy in 1834 for the most important discovery in that science made known within the preceding three years. The Academy conferred the prize on Sturm—not for the memoir which he had submitted to the judgment of the Commission, but for that which contained his celebrated theorem and which had been presented in 1829. Other memoirs relate to optics, mechanics, pure analysis, and analytical geometry, and embrace the most difficult questions which have been treated in those several branches of science. One of the latest of these was a communication to the Academy on the theory of vision, and is remarkable both for the geometrical and analytical elegance with which many questions subsidiary to the theory are treated in it. It confirms generally,—with one important exception relating to the asserted muscularity of the crystalline lens and the changes attributed to its action,—the views of the late Dr. Thomas Young in his well-known memoir on this subject.

Sturm visited England in 1841, and gave the mathematicians with whom he conversed a high impression, as well of the extent of his knowledge as of his inventive power.

The health of M. Sturm, which had previously been remarkably vigorous, began to decline in 1851, probably in consequence of his laborious public employments and the unremitting severity of his studies: he died on the 18th of December last, to the deep regret of a large circle of friends and pupils, to whom he appears to have been singularly endeared by the modesty, truthfulness, and simplicity of his character. "To my eyes," said M. Liouville, in the discourse which he pronounced at his grave, "Sturm was a second Ampère: candid like him, and like him equally indifferent to fortune and the vanities of life: they both of them joined to great inventive powers, an encyclopædic range of knowledge: neglected and even despised by men of the world and the worshipers of station and power, but exercising an unmistakeable impression upon the youth of our schools, where genius never fails to produce its impression: possess-

ing, in fact, without appearing either to desire it or to know it, an immense popularity."

The Rev. William Buckland, D.D., F.R.S., F.G.S. &c., Dean of Westminster and Reader in Mineralogy and Geology in the University of Oxford, was born in the year 1784, at Axminster in Devonshire. In 1797 he was at Tiverton School; in 1798 he entered St. Mary's College, Winchester, and passed from it in 1801, to a scholarship in Corpus Christi College, Oxford.

Admitted Fellow of that College in 1808, he manifested a decided taste for the study of geology, then beginning to be heard of in Oxford in the lectures of Dr. Kidd, the respected Professor of Mineralogy, and beginning to be cultivated in London by the founders of the Geological Society. While yet a child, his attention had been caught by the 'Cornua Ammonis,' found in the rocks round his home; at Winchester he began to collect the sponges and other fossils of the Chalk; at Oxford he gathered the shells of the Oolite, and discussed points of natural history on the ascent of Shotover Hill with his frequent companion Mr. Broderip of Oriel College, who had himself drawn no small amount of knowledge of these subjects from the Rev. J. Townsend, the friend and fellow-labourer of William Smith. The fruits of his first walk with Mr. Broderip formed the nucleus of that large collection which forty years later he placed in the Oxford Museum.

In the period from 1808 to 1812, Mr. Buckland was frequently seen traversing on horseback a large part of the south-western districts of England, and collecting from these tracts, which had been the scene of Mr. Smith's earlier labours, sections of the strata and groups of their organic contents.

In 1810 and 1811 he visited with the same purpose the north of England, Scotland, Ireland, and Wales.

In 1813 he received the Professorship of Mineralogy in consequence of the resignation of Dr. Kidd; he became a Fellow of the Geological Society, and took his place among the most active and most eminent of the inquirers into the physical history of the earth. The lectures which he now delivered were not confined to mineralogy, but embraced the discoveries and doctrines of geology, and they

attracted in a high degree the attention and admiration of the University. At length, in 1818, geology was publicly recognized in Oxford by the establishment of a Readership for this branch of science, and Buckland was appointed to the office. From this period the Reader gave annually one course of lectures on mineralogy and one on geology, sparing no pains and no expense in preparing these instructive and suggestive discourses, in which the very latest discoveries always found place.

Among his early contemporaries in Oxford none were so conspicuous in the cultivation of geology as the Rev. J. J. Conybeare and the Rev. W. D. Conybeare, both of Christ Church; and it is gratifying to remember that the strictest personal friendship united these eminent men in their subsequent brilliant career. It was in concert with W. Conybeare that Buckland gave to the press his first important paper "On the Coasts of the North of Ireland*,"—the result of a vacation tour from Oxford in 1813; and Mr. J. Conybeare was his companion in a visit to Devon and Cornwall.

In his journeys to the south-west of England he frequently called on the Rev. Benjamin Richardson of Farleigh Castle, near Bradford, and the Rev. Joseph Townsend of Pewsey, ancient friends of William Smith, and themselves among the ablest cultivators of the new views in geology. The latter of these eminent men imparted to the Oxford Professor his first knowledge of the details of superposition of the Oolite and Greensand formations between Bath and Warminster.

In the year 1818 he was elected a Fellow of the Royal Society, and speedily justified his claim to this honour by communicating to the 'Transactions' his well-known account of the teeth and bones of the Elephant, Rhinoceros, Hippopotamus, Hyæna, &c., discovered in Kirkdale Cave, 1821†. This Essay was honoured by the Copley Medal, and being soon after reprinted under the title of 'Reliquiæ Diluvianæ‡,' became a powerful stimulus to the cultivation of Geology and Palæontology throughout the world. Before the issue of this remarkable work, the author had traversed France, Italy, the Tyrol, Holland, Germany, and Bohemia, bringing to the now celebrated Oxford Museum large and valuable collections, and to the geologists of England observations of phenomena then little known to them. One result of these successful labours was the election of Buckland to

* Trans. Geol. Soc. vol. iii. † Phil. Trans. 1822. ‡ 4to, 1823.

the Chair of the Geological Society in 1824; and while he held this office, he received, in 1825, a valuable acknowledgement of his established merit in the gift of a Canonry of Christ Church. A more important event followed,—the happy marriage of Mr. Buckland to the excellent lady whose diligent hands and devoted affection shared every toil and lightened every anxiety of his life.

In the same year appeared, from the united hands of Buckland and Conybeare, the "Survey of the South-western Coal district of England," which even at this day may be consulted as one of the best guides to the geology of the singular country which it describes*.

In 1826 and 1827, he revisited the Continent to explore parts of France, Germany, Austria, and Switzerland. He then recognized the comparatively late geological date of the great upward movement of the Alps†, and declared some of the highly inclined rocks to be contemporaries of our Lias and Oolite. The Bone Caverns of Lunel and the Grotto d'Oselles‡ then yielded to his strong arms and capacious bags many valuable spoils, now preserved in the Oxford Museum. In the five years ending with 1830, we find him presenting to the Geological Society ten memoirs relating to Continental geology, and special researches among the fossils of Portland, Lyme Regis and the Mendips, the Isle of Wight, the Isle of Purbeck, and the coast of Weymouth.

In the latter memoir he was associated with one of his most valued friends, Sir H. T. De la Beche. To this period belong many of those curious researches on Coprolites and fossil Sepiæ, which attest at once the sagacity and industry of the great explorer of ossiferous caves. In 1832 Dr. Buckland cooperated with Dr. Daubeny and some other of his friends in the preparations for the Meeting of the British Association in Oxford, and was elected President of that brilliant and important meeting. In 1836 appeared the Bridgewater Treatise, 'Geology and Mineralogy, considered with reference to Natural Theology,' 2 vols. 8vo; a work equally attractive and valuable to the student.

The volumes of the Geological Society subsequent to 1833 contain many valuable notices of the unwearied labours of Dr. Buckland, one of the later and more interesting being a paper on the "Glacio-Dilu-

* Geol. Trans. 2nd ser. vol. i.

† Ann. Phil. new series, i. 4, 450.

‡ Geol. Soc. Proc. vol. i.

vial Phenomena in North Wales*." He was a contributor to the Linnean Society of a paper on the adaptation of Sloths to their way of life† (1835); and furnished many essays and notices on special subjects of interest to the Philosophical Magazine, Silliman's Journal, the Edinburgh Philosophical Journal, and the Reports of the British Association. The list published by Agassiz of the works and essays which bear the name of Buckland, extends to 66—spread over the whole period of his life in Oxford since 1813. In 1845 he became Dean of Westminster, and changed his residence, but not his habits of mental and bodily exertion. Sanitary measures, amendments in his Cathedral, agricultural improvements, the potato disease,—all occupied his attention, and consumed his time, so that from this time he almost ceased to labour as an author, though he still continued with unabated zeal the duties of his Professorship.

Dr. Buckland's numerous publications include very largely the results of personal observation, on features of physical geography, the succession of strata, the distribution of glacial detritus, the structure, habits of life, manner of death, and mode of occurrence of extinct animals. To him, more than to any geologist, are we indebted for unexpected suggestions, curious inquiries, and novel kinds of evidence. Thus in Kirkdale Cave, the peculiar condition of the broken bones—the smoothed surfaces of some—the worn aspect of others—the condition of the teeth—the layers of Stalagmite—the 'Album Græcum' —became in the mind of Buckland evidence of the mode of life and death of the former inhabitants. The footprints of Cheirotherium were joined with the ripple-mark of the rain-spot to determine the character of the mesozoic shore:—Coprolites were searched for the food of the Ichthyosaurus; snails were studied to explain holes in limestone; gelatine was extracted from the Mammoth's bones; toads were enclosed in cavities to determine their tenacity of life; the living hyæna was set to crush the bones of an ox, and thus to furnish evidence for the conviction of the old midnight robber of preglacial caverns.

Of general views on geology, Dr. Buckland was sparing as an author, though frequently and eloquently he declared them as a Professor. Physical Geology in its higher forms had scarcely existence in the earlier part of his career. Instead of contributing to its

* Geol. Soc. Proc. vol. iii. † Linn. Trans. vol. xvii.

progress in after-years, he laboured wisely and well in the rich field of special discovery: now collecting and describing the mighty reptiles like Plesiosaurus and Iguanodon, or the flying wonder the Pterodactylus; at another time studying the beaks of Chimæra, the wings of Neuroptera, the ink-bags of Sepiadæ; now questioning the great English Botanist on the reticulated stems of Cycadeoideæ, and fathoming the mind of Owen on the little Marsupialia of Stonesfield, or inviting the eagle glance of Cuvier on the serrated teeth of *Megalosaurus Bucklandi*.

So passed the life of this man, strong in mind and strong in body; working hard and setting others to work; gathering and giving knowledge; a patient student, a powerful teacher, a friendly associate; a valiant soldier for Geology in days when she was weak, an honoured leader in her hour of triumph.

Perhaps of all the varied marks of respect which were heaped upon him by the learned societies in all parts of the world, none yielded him higher gratification than that which threw a ray of splendour over his latest appearance at the meetings of the Geological Society. For there, in February 1848, he received from the hands of Sir H. T. De la Beche, with very appropriate expressions, the Wollaston Medal, which is the highest mark of honour known in Geological Science—an honour which would, doubtless, long before have been paid to him, but for the frequency of his election to office in that Society*. In the reply of Dr. Buckland to the Address of the President, we find expressions such as could only be uttered by a geologist convinced of the grand destiny of his science, and conscious of his own right to be remembered among the authors of "discoveries whose names are inscribed on the annals of the physical history of the globe." And these are followed by words which embody a humble confession of the comparative littleness and incompleteness of all human knowledge—words too prophetic of the approaching close of his own valuable and honourable career,—for within two short years that apparently indefatigable mind ceased from its labours, and only the form of Buckland survived till the 15th of August, 1856.

Dr. William Frederick Chambers died of paralysis in December 1855, aged 69 years. Prior to his retirement from active

* He was President for the second time in 1840–1841.

life on account of the disorder which finally proved fatal, he had for many years had the most extensive practice as a physician of any in London. The mental character to which he owed this distinction is interesting as a subject of psychological study, and valuable as an example and encouragement to those who desire to lead a similar life of usefulness. His intellectual powers were not of that order to which it is usual to apply the term "genius:" no original discovery, no striking innovation marked his career. Nor was he a man of very sparkling talent: there was nothing that could be called "brilliancy" in his thought, his writing, or his mode of action. What he possessed in an eminent degree was, wisdom, judgment—that peculiar balance of faculties which enables a man to think soundly and to be a safe adviser and guardian. The circumstances of his life had helped to give this form to his character. He had received his public education at Westminster and Cambridge, where the studies are such as to cultivate in an equal degree the imaginative and scientific faculties. The postponement of his entrance on special professional studies till he was three-and-twenty years of age, enabled him to bring to these studies, when he did engage in them, a fully-formed mind, and so to escape the danger often arising from crude prejudices acquired in early studentship. His election, at the age of thirty, as Physician to St. George's Hospital, kept him afterwards closely to the duties of practical life, from which he was never distracted by special scientific inquiries; and accordingly his lectures on the practice of medicine and the lectures on cholera, which at the request of his colleagues he gave in 1833, with the addresses which he delivered as President of the Medical and Chirurgical Society in 1846 and 1847, constitute the bulk of what he has published to the world. He became a Fellow of the Royal Society in 1828, and through life was a conspicuous illustration of the intimate connexion between sound science and practical usefulness.

Sir Alexander Crichton, second son of Mr. Alexander Crichton of Woodhouselee and Newington in Mid Lothian, was born in Edinburgh on the 2nd of December, 1763. He received his elementary education in his native town, and afterwards matriculated in its University. He was placed at an early age with Mr. Alexander Wood, a surgeon of eminence in Edinburgh. At the expiration

of his apprenticeship, in 1784, Mr. Crichton came to London to prosecute his studies, more especially anatomy, and the following spring he went to Leyden, in company with Mr. Robert Jackson, who became afterwards so favourably known by his writings on subjects connected with military surgery. Though Mr. Crichton had been brought up with the view of prosecuting surgery as his profession, he thought it advisable to submit himself to the necessary examinations before the Professors of Leyden for the degree of M.D., which he obtained in July 1785.

After passing a short time in Holland, he proceeded to Paris to perfect himself in the French language, and to avail himself of the facilities afforded in that city for advancement in every department of medical knowledge.

Leaving Paris in the summer of 1786, Dr. Crichton studied successively at Stuttgardt, Vienna, and Halle, residing, during his stay at the last-named University, in the house of Professor Meckel, the second celebrated anatomist of that name. He then passed some time in Berlin and in Göttingen, where he remained till September 1788. Returning from Germany, where he had spent three years in the acquisition of medical and scientific knowledge, Dr. Crichton established himself in London as a surgeon, and became a member of the Corporation of Surgeons in May 1789. But not liking the operative part of the surgical profession, he withdrew from that body on May 1, 1791, and became a licentiate of the Royal College of Physicians on the 25th of June, 1791; shortly after which he was appointed Physician to a large Dispensary in Featherstone Buildings, Holborn. There, in conjunction with Dr. Bradley, he formed a "Clinical Institution," upon a plan similar to that followed at the University of Göttingen, and delivered Lectures upon the most remarkable and instructive cases which presented themselves. About 1796 Dr. Crichton was elected Physician to the Westminster Hospital, and during his connexion with that institution he was in the practice of delivering three courses of lectures; viz. on Chemistry, on Materia Medica, and on the Practice of Physic. In 1798 he published his work on Mental Derangement, which gained him reputation at home and abroad; and having now attained a high professional position, he was appointed Physician to the Duke of Cambridge. In 1803 Dr. Crichton was invited to become physician

in ordinary to His Imperial Majesty Alexander I. of Russia. Having accepted this appointment, he was kindly received in St. Petersburgh, and soon gained the full confidence and esteem of the Emperor and the several members of the imperial family. In the course of a few years he was also appointed to the head of the Civil Medical Department, in which capacity he was much consulted by the Empress Dowager, in the construction and regulation of many institutions which owe their origin to her active charity and watchful superintendence.

Dr. Crichton's exertions to mitigate the horrors of an epidemic which was devastating the south-east provinces of Russia in 1809 were acknowledged by the Emperor, who conferred on him the title of Knight Grand Cross of the Order of St. Vladimir, Third Class. In 1814 His Imperial Majesty bestowed on him that of the Second Class for his long and faithful services, and as "Médecin en chef pour la partie Civile." Having obtained leave of absence on account of the state of his health, he returned to this country in the spring of 1819. The following year, however, he was recalled to attend the Grand Duchess Alexandra (the present Dowager Empress), whom he accompanied, on her convalescence, to the court of Berlin, where he stayed a short time, and then returned to his family. On the 27th of December, 1820, His Majesty Frederick William III. created him Knight Grand Cross of the Red Eagle, Second Class. In 1821 Dr. Crichton was knighted by His Majesty George IV., and obtained the royal permission to wear his foreign orders. The late Emperor Nicholas I. also marked his sense of the services of Sir Alexander Crichton by bestowing upon him the additional title of Knight Grand Cross of the Order of St. Anne, in August 1830.

Dr. Crichton married, in 1800, Frances, daughter of Mr. Edward Dodwell, of West Moulsey. He was one of the oldest members of the Linnean and Royal Societies, having been elected a member of the first in 1793, and of the latter in 1800. He was member of the Imperial Academy of Sciences of St. Petersburgh, and of the Imperial Society of Naturalists of Moscow, and Corresponding Member of the Royal Society of Sciences of Göttingen, of the Royal Institute of Medicine at Paris, and of many other societies. His writings were the following :—

A Translation of Dr. J. F. Blumenbach's Essay on Generation. 1792.

An Inquiry into the Nature and Origin of Mental Derangement, &c. London, 1798.

An Account of some Experiments made with the Vapour of Boiling Tar in the Cure of Pulmonary Consumption. 1817.

On the Treatment and Cure of Pulmonary Consumption, and the Effects of Boiling Tar on that Disease. 1823.

Commentaries on some Doctrines of a dangerous tendency in Medicine, and on the general principles of Safe Practice. 1842.

GEORGE JAMES GUTHRIE was born in London on the 1st of May, 1785, and died on the 71st anniversary of his birthday. He was descended from an old and respectable Forfarshire family, one of whom, his great-grandfather, married an Irish lady, and settled in her country. His father, a manufacturer of plaister and other surgical materials, raised himself from poverty to considerable wealth; but, late in life, was again impoverished, and left his son at an early age to seek and work his own way in the world. He was educated in boyhood by an emigrant French gentleman, M. Noel; and, when thirteen years old, he was apprenticed to the medical profession, at the instance of Mr. Rush, one of the Army Medical Board. For a time he received his chief instruction from Dr. Hooper, one of the most active pathologists of the day. In June 1800 Mr. Rush appointed him an hospital-assistant at York Hospital (a military hospital which then stood on part of the site of Eaton Square); and in the following winter he assisted Mr. Carpue in teaching anatomy. In the beginning of 1801 he was to have been removed from his appointment, with all the other hospital-assistants who had not been examined at the College of Surgeons; and it gave proof of the success with which he had already studied, and promise of the spirit which marked his after-life, that he immediately offered himself for the examination. He passed, and obtained his diploma at the College in February 1801; and in the next month, though not yet sixteen, was appointed assistant-surgeon to the 29th Regiment, with which, from 1802 to 1807, he served in North America.

In 1808, Mr. Guthrie having risen to the surgeoncy of his regiment, accompanied it to Spain; and from that time to the end of the Peninsular war (with the exception of a period of severe illness in 1810), was engaged in the most active service. He had a chief share in the charge of the wounded at the battles of Roliça and Vimiera;

at the taking of Oporto; at Talavera and Albuera; at the sieges of Olivença and Badajos; at Ciudad Rodrigo, Salamanca, and Toulouse. In these fields of action he justly earned the highest reputation among the British military surgeons of his time; and all his writings prove that they were to him fields not only of action but of study.

In September 1814, Mr. Guthrie was placed on half-pay, and commenced private practice in London. After the battle of Waterloo, he spent a few weeks at the military hospitals at Brussels and Antwerp, studying chiefly those points of practice on which his Peninsular experience had left him uncertain. Returned to London, he commenced lecturing on surgery in 1816, and was appointed surgeon to the Westminster Ophthalmic Hospital, the establishment of which was chiefly due to his exertions. In 1826 he was elected assistant-surgeon, and in 1827 full surgeon to the Westminster Hospital. In the last-named year, also, he was elected a Fellow of the Royal Society. In the College of Surgeons, he became a Member of the Council in 1824, President in 1833, 1842, and 1854, and during five years was Professor of Anatomy and Surgery. [Nearly all the foregoing statements are derived from an evidently authentic biography of Mr. Guthrie in the 'Lancet' of June 15, 1850.]

It would be very difficult to form a catalogue of Mr. Guthrie's publications, for he was always active in publishing his knowledge and opinions on all the questions which he had had opportunities of studying. His chief works are,—"On Gun-shot Wounds of the Extremities requiring Amputation" (1815); "Lectures on the Operative Surgery of the Eye" (1823); "On the Diseases and Injuries of Arteries" (1830); "On the Anatomy and Surgery of Herniæ" (1833); "On the Anatomy and Diseases of the Urinary and Sexual Organs" (1836); "On Injuries of the Head, affecting the Brain" (1842); "On Wounds and Injuries of the Abdomen and the Pelvis" (1847); "Commentaries on the Surgery of the War in Portugal, Spain, France, and the Netherlands," of which the last edition was published in 1855, and comprised additional observations on the Surgery of the Crimean war.

Enterprise, activity, and self-reliance were the chief characteristics of Mr. Guthrie's mind. His intellect was acute and clear; his

habits orderly and business-like; his constitution naturally robust, and, till he reached old age, capable of great exertion and endurance. These qualities, in circumstances so favourable to their exercise as those of the Peninsular war, quickly and justly placed him in the first rank of military surgeons, and accomplished a large amount of good in the medical department of the Army. In after-life, the same qualities, strengthened by success, ensured great influence for what he taught, gained for him a large private practice in surgery, and made him a man much to be considered in all the questions of professional interest in which he was engaged. His influence on the progress of medical science in his own time was that of an earnest advocate and an attractive teacher of whatever appeared simple and straightforward in practice, and of all surgical doctrines that professed to be based upon correct anatomy. In the future history of surgery, he will be remembered for his advocacy of the use of nitrate of silver in purulent ophthalmia, of large incisions in phlegmonous erysipelas, of acid escharotics in sloughing phagedæna, and for the skill and boldness of his treatment of gun-shot wounds. But, especially, his name will probably be always mentioned with honour for his maintenance of the general necessity of tying wounded arteries at the very seat of injury, above and below the opening. The usual practice had been to tie the artery at some convenient part above the wound, on the assumption that the arrest or diminished force of the circulation would allow the firm closure of the wound, as it does the obliteration of an aneurismal sac. Few things in modern surgical works are equal in strength and clearness to the chapters in which Mr. Guthrie proved the error of such an assumption, and the advantages of his own mode of practice. In anatomy, his best work was the bringing to general knowledge the *musculi compressores urethræ*, which, though described by Santorini, had nearly ceased to be recognized. In the medical department of the Army, his influence for good was undoubtedly considerable. It may be difficult to enumerate the improvements that were due to him; but, as the last edition of his best work—the 'Commentaries on the Surgery of the War'—will prove, he was to the very end of life urgent in promoting the efficiency of military hospital-establishments, and in maintaining the reputation of the medical officers of the Army.

Daniel Sharpe was born in London in 1806. His mother, who died a few weeks after his birth, was sister to Samuel Rogers the poet. He was educated at Walthamstow, and as a boy early showed a taste for the study of natural history, but he did not commence seriously to work at geology till he was admitted a Fellow of the Geological Society in June 1829. In the same year he gave his first memoir to the Society, "On a new species of Ichthyosaurus, &c."—*I. grandipes*—which, however, it afterwards appeared, had been previously described by Conybeare, under the name of *I. tenuirostris*.

Throughout the greater part of his life Mr. Sharpe was actively engaged as a merchant, and his business connexion with the wine-growing districts of Portugal occasionally leading him there, in 1832, 1839, 1848 and 1849 he gave to the Geological Society a series of memoirs on the rocks in the neighbourhood of Lisbon and Oporto. The first is a mere sketch of the general arrangement of the Tertiary and Secondary rocks by a young and intelligent geologist;—the second, on the same subject, is fuller and more definite, but not sufficiently complete in the determination of fossils to fix the precise age of the strata described. It contains, however, in an appendix, some observations of great value on the comparative effects of the great earthquake of 1755 on the strata on which Lisbon stands. The destructive effects of this shock were chiefly confined to the area occupied by the soft tertiary beds, while the buildings erected on the more solid Hippurite limestone and chalk escaped entirely. The line of division between the shattered and entire buildings corresponded precisely with the boundaries of the strata. This subject has since been elaborated by Mr. Mallet in his Reports on Earthquakes to the British Association. In his third memoir Mr. Sharpe describes the granitic, gneissic, clay-slate and coal-bearing rocks of Vallongo near Oporto. The clay-slate he proved by its fossils to be of Lower Silurian age, and his sections show that the strata bearing anthracitic coal underlie the slate, and rest on gneiss pierced by granite. He thence concluded that the coal is of Lower Silurian age. In the present state of knowledge regarding that country, it is impossible to deny that this may be the case, but it must be remembered that the few remains of plants discovered in these strata are considered by palæontologists to present characters indicative of "Carboniferous"

age; and even those geologists who most strenuously support the so-called uniformitarian doctrines, incline to attribute the peculiar position of the coal to one of those great inversions of the strata so frequent in highly disturbed districts of all ages, from Palæozoic up to Tertiary times.

The fourth paper commences with a succinct sketch of the general geology of Portugal, and goes on to define the limits of the secondary rocks north of the Tagus, both by stratigraphical and palæontological evidence. Long before this paper was read, Mr. Sharpe had acquired much critical skill and knowledge as a palæontologist, and on palæontological principles he now established the existence of Cretaceous and Jurassic rocks in the country described. The whole formed an excellent sketch of a hitherto undescribed country, and up to this date British geologists are chiefly indebted to these memoirs for the knowledge they possess of a land where the science is almost uncultivated.

Between 1842 and 1844 Mr. Sharpe gave four memoirs to the Geological Society on the Silurian and Old Red Sandstone Rocks of Wales and the North of England, territories previously chiefly illustrated by the labours of Professor Sedgwick. The first of these is "On the Geology of the South of Westmoreland." Part of this paper describes the range of the Coniston limestone. Mr. Sharpe identified it by its fossils as forming part of the Lower Silurian series, but did not determine its actual horizon. In 1839 Mr. Marshall placed it on the parallel of the Caradoc sandstone, which determination the researches of later geologists have sustained.

Mr. Sharpe also pointed out the unconformity of the Upper on the Lower Silurian rocks of the area; and in describing the passage of the Ludlow rocks into the Old Red Sandstone, he correctly infers that the Tilestones of South Wales should be withdrawn from the base of the Old Red Sandstone and classified with the Ludlow rocks, to which their fossils unite them. At a later period of the same year he produced a memoir "On the Bala Limestone, and other portions of the Older Palæozoic Rocks of North Wales." Up to this date it was believed that at Bala and elsewhere there was a great thickness of fossiliferous Upper Cambrian rocks below the Lower Silurian strata. Mr. Sharpe maintained that this was an error, and that both stratigraphically, and by their fossils, the Bala rocks were the equi-

valents of the Llandeilo flags and Caradoc sandstone. This sagacious determination has since been confirmed by Mr. Salter as regards the Caradoc sandstone; the fossils of Bala and the typical Caradoc sandstone of Sir Roderick Murchison in Shropshire being the same.

The more elaborate paper of 1844 is accompanied by a geological map of North Wales, and is less happy. Mr. Sharpe's genius chiefly lay in the palæontological determination of the age of rocks, and, in this case at least, the time he allowed himself to map North Wales was too short for the satisfactory elucidation of the problems he proposed to solve.

Pursuing at intervals these subjects, Mr. Sharpe produced in 1847 an elaborate analysis and comparison of the Silurian fossils of North America (collected by Sir Charles Lyell) with those of Great Britain, and confirmed the views entertained by the American geologist, Mr. Hall, that the American Silurian strata, like the British, consist of two great divisions, viz. Upper and Lower.

While engaged in these investigations, Mr. Sharpe's attention was drawn to the subject of slaty cleavage and foliation, which affects the more ancient rocks of Devonshire, Wales, the North of England, the Highlands of Scotland, and Mont Blanc. In 1846, 1848, 1852 and 1854 he produced four memoirs on these subjects, the two first and the last of which are published in the Journal of the Geological Society, and the third in the Philosophical Transactions. These questions had previously been made the subject of special investigation by Professor Sedgwick, Mr. Darwin, and Professor Phillips. It has been said that from imperfect data Mr. Sharpe generalized too largely; and though this may be the case, an attentive perusal of the memoir of 1846 proves that in some important points he materially advanced the subject at that date in the direction to which the labours of Mr. Sorby have since tended. He attributes the cleavage of rocks, and consequent distortion of fossils, to pressure perpendicular to the planes of cleavage, and asserts that rocks are expanded along the cleavage planes in the direction of the dip of the cleavage. In the communication of 1848, the doctrine that pressure is the cause of cleavage is still more distinctly insisted on, and remarkable instances are given in which *pebbles* were observed which appeared to have been compressed and elongated in the planes of cleavage. He also recognizes the fact, since so beautifully explained by Mr. Sorby,

that the fine particles composing the slaty rocks are arranged lengthwise in the direction of the cleavage planes, and he attributes bends in the cleavage in its passage from one bed to another, to beds of different lithological character offering different degrees of resistance to pressure. The idea that cleavage may be due to crystalline action, he altogether repudiates. The two last of the series, published in 1852 and 1854, describe respectively the cleaved and foliated rocks of Scotland and Mont Blanc, and are chiefly devoted to the development of his theory of the great "cylinders" or arches, in which he asserted that the laminæ of cleaved and foliated rocks lie. In these memoirs he made no advance beyond his previous ideas, for he attributed the formation of cleavage and foliation to the same cause; and though he indicated the fact, he gave no explanation of the reason of the occurrence of planes of cleavage and foliation in arched lines, a subject that has since in part been acutely treated of by Mr. Sorby, and of which the full explanation seems not far distant.

Besides these memoirs, Mr. Sharpe contributed to the Geological Society various papers on special subjects:—"On the Quartz Rock of MacCulloch's Map of Scotland;" "On the Southern Borders of the Highlands of Scotland;" and various palæontological communications: "On the genus *Trematis*;" "On *Tylostoma*, a new genus of Gasteropods from the Cretaceous beds of Portugal;" "On the genus *Nerinæa*;" and a note on the fossils of the Boulonnais, appended to a paper by Mr. Austen on that district. He also furnished several parts of a Monograph to the splendid publications of the Palæontographical Society, "On the Fossil Remains of the Mollusca found in the Chalk formation of England," and on this important work he was still engaged when he met with the unhappy accident that caused his untimely death.

Such is a brief outline of some of the scientific labours of Daniel Sharpe—a man, whose mind alike powerful and active, and well cultivated, urged him successfully to grasp and make his own a wider range of subjects than many geologists dare to attempt. Neither should it be forgotten that all the while he was unceasingly engaged in mercantile pursuits, and it was only during brief intervals of leisure, when more imperative labours were over, that he accomplished what many would consider sufficient work for their lives. And it is not in geology alone that he is known and appreciated:

philologists and ethnologists equally esteemed him. With marvellous versatility of talent he grappled with the ancient Lycian inscriptions, brought home by Fellows, Forbes and Spratt, and revealed the secrets of an unknown tongue written in an unknown character.

In debate he was clear, keen, severely critical, and at times somewhat sarcastic, occasionally alarming to an opponent unaccustomed to his style; but those who knew him best were well aware that an unvarying fund of kindly good humour lay beneath, and that if he hit his adversary hard, no man than himself more rejoiced in a harder blow in return. His private life was full of unostentatious benevolence. In conversation with his familiars he was intelligent, lively, and quick in perception, and his attached friends of the Geological Club, of which he lately was President by virtue of his office as head of the Society, will long mourn his loss, and miss the quaint humour and quiet laugh that so often helped to animate their board.

Mr. Sharpe was a Fellow of the Linnean, Zoological, and Geological Societies. In 1853 he became Treasurer of the Geological Society, and on the retirement of Mr. Hamilton was elected its President in 1856. In 1850 he was elected a Fellow of the Royal Society. On the 20th of last May, while riding near Norwood, he was thrown from his horse, and sustained a fracture of the skull. In a few days he so far recovered as to be able to recognize the relations that were admitted to his chamber, and his numerous friends rejoiced in the prospect of his speedy restoration; but a sudden relapse succeeded, and he died on the 31st of May, sorrowed for by all who knew his worth.

James Meadows Rendel was born in 1799, at a village on the borders of Dartmoor, in Devonshire; his grandfather, Mr. Meadows, F.R.S., was a well-known architect, and his father, who was a county surveyor and farmer, was a man of ability, excellent common sense and determination of character, qualities which descended to the son, whilst to his mother, who was a woman of considerable acquirements, he owed the rudiments of his early education.

After being practically instructed in the executive part of his profession, he went to London and obtained an engagement under Mr. Telford, by whom he was employed on the survey and experiments for the proposed suspension bridge over the Mersey, at Runcorn, and

subsequently on the survey and construction of roads in the north of Devon, where the difficulties he had to contend with contributed much to create that self-reliance so useful to him in his subsequent career. At that period he was introduced to the Earl of Morley, who discovering the latent talents of the young engineer, then scarcely twenty-five years of age, confided to him, with the approval of Mr. Telford, the construction of a cast-iron bridge across the Lary, an arm of the sea within the Harbour of Plymouth. This bridge, consisting of five elliptical arches, was, with the exception of that of Southwark, the largest cast-iron structure of the kind in the kingdom. Its construction, in which Mr. Rendel was engaged between 1824 and 1827, presented many difficulties demanding considerable skill and decision on the part of the engineer; but these difficulties were successfully overcome, and for the account of this work the Telford Medal of the Institution of Civil Engineers was awarded to him. About this period he designed and executed the Boucombe Bridge, where hydraulic power was for the first time applied to the machinery for working swing bridges.

Soon after the completion of the Lary Bridge, Mr. Rendel settled in Plymouth, and there exercised his profession with great activity, being engaged in surveying and reporting upon nearly all the harbours in the South-west of England, and executing the works at a large number of places, acquiring that mastery over Hydraulic Engineering on which his fame will chiefly rest. He was extensively employed by the Exchequer Loan Commissioners; in many cases executing the works thus authorized.

In the year 1831 he introduced a new system of crossing rivers by means of Floating Bridges worked by steam power; they were applied at Saltash and at Torpoint, on the river Tamar, and subsequently at Southampton and Portsmouth; but the rapid progress of the railway system prevented the further development of this useful invention, for which the Telford Medal was awarded. Descriptions of the structure of these bridges, as well as of that over the Lary, were published in the Transactions of the Institution of Civil Engineers.

The repairs of the Montrose Suspension Bridge, after its fall, were confided to him, and he there introduced the system of imparting that rigidity to the platform of the roadway which is now admitted to be so essential to the safety of these structures. He was also

engaged in the surveys for a railway between Exeter and Plymouth, but the necessary funds not being provided, the scheme was abandoned, and the district eventually falling under the control of the Great Western Railway Company, the present line of railway was constructed by Mr. Brunel.

In the year 1838 Mr. Rendel removed to London, where he was soon consulted upon many important works, and was engaged in the chief parliamentary contests of that remarkable period in the history of engineering. About this time he designed the Pier at Millbay, where he introduced the system of construction since employed with so much success at the harbours of Holyhead and Portland. Engagements poured in fast upon him, and his career was for the next few years one of unceasing activity, chiefly in the construction of Harbours or Docks, and the improvement of Rivers and Estuaries.

In the year 1843, the projected construction of Docks at Birkenhead, in Cheshire, of such an extent as to create a formidable rival to Liverpool, brought Mr. Rendel very prominently before the world; and the protracted contests on this subject will be long remembered in the history of Parliamentary Committees, for the ability with which he defended his positions; and the evidence given by him and other Engineers, as now collected, forms a valuable record of the state of engineering practice. The almost incessant labour, and the mental anxiety inseparable from this undertaking, were more than even his powerful constitution could support, and it is feared that they tended to shorten his valuable life.

The daring project of constructing a dock at Great Grimsby, by projecting the works far out upon the mud-banks of the River Humber, was next successfully accomplished; and he commenced the two great works which alone suffice to hand down his name to posterity, beside those of Smeaton, Rennie, and Telford,—the Harbours of Refuge of Holyhead and Portland; both these works were conceived with the largest views, and have been carried on with great rapidity. In both cases the system was adopted of establishing timber stages over the line of the jetties and depositing the large and small stones together, as they came from the quarries, by dropping them vertically from railway waggons into their positions; thus bringing up the mass simultaneously to above the level of the sea. In this manner as much as 24,000 tons of

stone have been deposited in one week, and to supply this vast demand, monster blasts of five or six tons of gunpowder were frequently employed. These two great works are advancing very satisfactorily; and it is worthy of remark, that although the severe storms which have repeatedly occurred on the exposed coasts where they are situated, have done some injury to portions of the stages, and of the temporary works, at Holyhead—where the piles were not shod with Mitchell's screws, which proved so successful at Portland—not a stone would appear to have been carried away from the jetties; and the success of the system may be said to be complete, in spite of the sinister predictions which prevailed before it was tried.

Among the other works upon which Mr. Rendel was engaged, should also be mentioned the constructions on the River Lea, and the improvements of the Nene river; the latter an undertaking of considerable difficulty, and not yet completed. He was also employed by the Exchequer Loan Commissioners to report upon the drainage and other public works in Ireland.

He was less engaged in railways than in hydraulic works, but in England he executed the Birkenhead, Lancashire, and Cheshire Junction Line, and in India he had the direction of the "East Indian" and the "Madras Railways," the former projected by Mr. (now Sir Rowland) Macdonald Stevenson, as the first of the vast system now in progress which will doubtless exert a mighty influence on the future destiny of the Indian Empire. The Ceylon and the Pernambuco lines were also under his charge.

It would unduly extend this sketch to notice in particular the various hydraulic works upon which Mr. Rendel was engaged, as there was scarcely a harbour or river of importance in the kingdom with which he was not connected in some capacity. His advice was also sought by foreign countries; and he was engaged to report upon works for the Brazilian, the Prussian and the Sardinian governments, and was nominated by the Viceroy of Egypt a Member of the International Commission for considering the construction of the Canal across the Isthmus of Suez.

He was a man of great energy, clear perception, and correct judgment; his practical knowledge was well directed, and he knew how to make good use of the scientific acquirements and skill of all whose services he engaged. His evidence before Parliamentary Committees

was lucid and convincing,—seldom failing in carrying his point; and his Reports on Engineering works are distinguished by the clearness and correctness of his views and the fearless expression of his opinion, and are so well conceived and drawn up, that it may be hoped they will be given to the world. With these qualities, which were fully appreciated, it need scarcely be added that he rose rapidly to a very high position in his profession. He became a Fellow of the Royal Society in 1843, and was elected upon the Council; he was a very early Member of the Institution of Civil Engineers, having joined it in 1824. He had been for the last sixteen years upon the Council, and held the post of President during the years 1852 and 1853.

Mr. Rendel was as amiable and kind in private life as he was energetic and firm in public, and his decease, which occurred on the 21st of November, 1856, cast a gloom over the whole of the profession of which he was a brilliant ornament.

Rear-Admiral Frederick William Beechey, V.P.R.S., P.R.G.S., was the second son of the eminent painter Sir William Beechey, R.A. He was born on the 17th of February, 1796, and his godfather was H.R.H. the Duke of Clarence, afterwards William the Fourth.

When only ten years of age, he was sent to sea on board the 'Hibernia,' under the immediate patronage of Lord St. Vincent; and it may be justly presumed that the well-known sentiments and practice of that stern disciplinarian had no small influence in forming the young seaman's professional character, and especially in inspiring that unremitting activity and devotion to duty for which in after-life he was conspicuous.

After a short time passed on board the 'Minotaur,' young Beechey went with the gallant Sir Sidney Smith, in the 'Foudroyant,' to Brazil. In 1811 he served on board the 'Astræa,' frigate, Captain Schomberg, and as an ardent youth of fifteen, and captain's aid-de-camp, shared in those long and gallant actions off Madagascar, in which his ship bore a part, and which ended in the capture of two French frigates, and the surrender to the British of the Fort and Settlement of Tamatave. After this he remained a short time on the home station, and in 1815 was on board the 'Vengeur' in the

Expedition against New Orleans, and took part in the operations on the Mississippi in support of the general attack on the American lines. While on board the 'Tonnant' he received his commission as Lieutenant, dated 10th of March, 1815, and in the following year was appointed to the 'Niger,' frigate, on the North-American station.

In January 1818, when he had been nearly twelve years in active service, Lieutenant Beechey commenced his career as an Arctic voyager, under his friend the late Sir John Franklin, in the 'Trent,' which vessel was associated with the 'Dorothea,' Captain Buchan, in an attempt to discover a northern communication between the Atlantic and Pacific Oceans. In this Expedition many important scientific observations were made, and much useful information was gained respecting the coast of Spitzbergen and the sea adjacent; and it is worthy of note, that, with the exception perhaps of some early voyages by the Dutch, this, and the contemporaneous voyage of Captain Ross to Baffin's Bay, were the first in which very deep soundings were obtained; mud and stone being brought up from the bottom at a depth of more than a thousand fathoms, by means of the contrivance called "deep-sea clamms." A narrative of this Expedition was published by Lieut. Beechey in 1843, and has often been favourably noticed by foreign as well as English journals. On his return from this voyage, Beechey and his late commander, Lieutenant Franklin, volunteered to attempt to reach the North Pole by a journey over the ice; and with this view they submitted to the Admiralty a plan of proceeding, which was afterwards adopted, and to a great extent carried out by Sir Edward Parry in 1827.

In January 1819 Lieutenant Beechey was appointed to the 'Hecla,' under the command of Lieutenant (afterwards Sir Edward) Parry, with whom he penetrated to the western longitude of 113° 55′, within the Arctic Circle, wintered at Melville Island, and shared the Parliamentary reward of £5000.

In these Arctic expeditions the merits of Lieut. Beechey as an able and vigilant officer, a skilful astronomical observer, and an accomplished draughtsman, met with general recognition; but it was also in these memorable voyages,—through hardships and exertions, disregarded as usual at the time by a young and ardent

adventurer,—that the foundation was laid of disease, which was destined to terminate prematurely his valuable life.

In January 1821 Lieut. Beechey was appointed to the 'Adventure,' then commanded by Captain (now Rear-Admiral Smyth); and in November of the same year, he was detached from the ship in charge of an Expedition along the northern shores of Africa, and round the greater Syrtis towards Egypt. In this Expedition Lieut. Beechey surveyed all the coast between Tripoli and Derna, explored the country and antiquities of the Cyrenaica, and determined the sites of the five cities of the Pentapolis. In this service he was accompanied by his brother Mr. Henry Beechey, whose intimate knowledge of the language, as well as of the manners and customs of the inhabitants, acquired whilst with Messrs. Salt and Belzoni during their researches among the Pyramids, was of the greatest assistance. An account of this interesting Expedition was published in 1828.

While on this service Lieut. Beechey was promoted; and in January 1825 was appointed to command the 'Blossom' on a voyage to the Pacific and Arctic Oceans, intended to co-operate with the Polar Expeditions under Parry and Franklin. During this voyage he passed twice through Behring's Strait, and explored the north-west coast of America, 120 miles beyond the farthest point of Cook, attaining to lat. 71° N. and long. 156° W.,—a spot scarcely 150 miles from the extreme point reached by Franklin overland. The intervals between the seasons available for Arctic navigation were passed in visiting many parts of the Pacific Ocean, where he discovered and made surveys of several new islands, and contributed largely to the hydrography and general knowledge of those regions. In 1827 Commander Beechey was promoted to the rank of Captain, and in the following year returned to England with his ship, in which, notwithstanding her dull sailing, he had traversed 73,000 miles, and rendered valuable service to navigation and general science. In 1831 he published a narrative of this voyage, replete with interesting and valuable information, and evincing throughout the high qualifications of the author for the conduct of such an Expedition.

In 1835 Captain Beechey was appointed to the 'Sulphur,' to undertake another voyage of exploration and survey, but the inroads which engrossing pursuits and incessant mental activity had even

then made in his health, obliged him to return home from Valparaiso in 1836.

After an interval of leisure passed with his family, his ardent desire of active employment induced him, in 1837, to accept an appointment to conduct various surveys of the Irish Sea and the Western Coasts of England and Wales. Among the important results of these surveys was a series of observations on the Tides around the British Islands, which formed the subject of a paper read before the Royal Society, and published in the 'Philosophical Transactions;' and the estimation of Captain Beechey's labours by the Society may be judged of by the fact, that the Council requested the Admiralty to afford him the means of continuing his inquiries.

For some years subsequently, Captain Beechey was chiefly employed in continuing these services, and in reporting to Government on harbours, stations for marine postal communication, and other public undertakings of a like description. In 1848 and 1849 he attended Her Majesty in her visits to Scotland and Ireland, in charge of the pilotage of the Royal Squadron; and in 1851 he was appointed Aide-de-camp to the Queen.

The Government having resolved to establish the Marine Department of the Board of Trade, Captain Beechey was chosen to assist in its organization, and in this important and very onerous duty, to which he was appointed in 1850, he laboured incessantly, day and night, to the great detriment of his health. In 1853 he was selected to take part in the "Meteorological Conference" held at Brussels, for the purpose of devising a great scheme of international co-operation in obtaining meteorological observations at sea, which was to be promoted and superintended on the part of England, by the Marine Department of the Board of Trade. In the following year he obtained his Flag as Rear-Admiral on the active list.

Admiral Beechey had long been Fellow of the Astronomical, Geological, and Geographical Societies, and had contributed valuable communications to these bodies. He was elected into the Royal Society in 1824, and in 1854 was nominated a Vice-President; at the time of his decease he was President of the Royal Geographical Society.

A short time before Admiral Beechey's acceptance of the Presidency of the Geographical Society, he was attacked by severe illness,

the consequence of hardships endured and bodily and mental powers overstrained, in the cause of science and of that profession to which through life he was so earnestly devoted. The Chair was, however, left vacant in the hope of his speedy recovery, and on this hope being to some extent fulfilled, he was unanimously elected, and entered with his usual zeal on the duties of that honourable position. This was in 1855: in May of the following year he delivered his Presidential Address at the Anniversary Meeting of the Society, and this was his last conspicuous public duty. His health, notwithstanding his partial recovery, was permanently broken, and a renewed attack of illness terminated his useful life on the 29th of November, 1856, in the sixty-first year of his age.

It may be long before we are called on to record public services of nearly half a century more ably, earnestly, and usefully performed than those of Admiral Beechey. On his private virtues this is not the occasion to expatiate; it will suffice here to say that he was a sincere Christian, and a gentleman in the best sense of the term, and that through life he was supported by a firm trust in Providence, and actuated by a single-minded determination at all times to do his duty.

Admiral Beechey married, in 1828, Charlotte, youngest daughter of Colonel Stapleton, of Thorpe Lee, Surrey, and has left several children.

On the motion of Sir Benjamin Brodie, seconded by the Rev. Professor Powell, the best thanks of the Society were voted to the President for his excellent address, and his Lordship was requested to permit the same to be printed.

The Statutes relating to the election of Officers and Council having been read, and Dr. Gray and Professor Bell having been, with the consent of the Society, nominated Scrutators, the votes of the Fellows present were collected.